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CURRENT PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES [1]

February 28–March 27, 1937

The prevalence of certain important communicable diseases, as indicated by weekly telegraphic reports from State health departments to the United States Public Health Service, is summarized in this report. The underlying statistical data are published weekly in the PUBLIC HEALTH REPORTS, under the section entitled "Prevalence of Disease."

Influenza.—Data showing the progress of the minor outbreak of influenza which reached its peak in the various sections of the country during the months of January and February have been published every 4 weeks in the PUBLIC HEALTH REPORTS (see footnote 1 to table 1). During the month of March both reported cases of and deaths from influenza and pneumonia have decreased in every section. Table 1 shows for the 4 weeks of March the number of reported cases, the mortality rates for influenza and pneumonia, and mortality rates for all causes for all sections combined. There has been an excess in the number of reported cases of influenza as compared with the corresponding weeks of 1934—12,000 excess cases for the week ended March 6 and 4,000 for the week ended March 27. The slight excess in mortality from influenza and pneumonia during March is due to the higher rates in the South Atlantic, East South Central, and West South Central areas. For the week ended March 20, the last week for which mortality data are available, there is still a slight excess in the latter two areas. Mortality from all causes was about the seasonal expectancy during March.

[1] From the Office of Statistical Investigations, U. S. Public Health Service. These summaries include only the 8 important communicable diseases for which the Public Health Service receives weekly telegraphic reports from the State health officers. The numbers of States included for the various diseases are as follows: Typhoid fever, 48; poliomyelitis, 48; meningococcus meningitis, 48; smallpox, 48; measles, 46; diphtheria, 48; scarlet fever, 48; influenza, 44 States and New York City. The District of Columbia is counted as a State in these reports.

TABLE 1.—*Number of cases of influenza and death rates from influenza and pneumonia and from all causes in each geographic area, by weeks, from Feb. 28 to Mar. 27, 1937* [1]

Region	Week ended—											
	Mar. 6	Mar. 13	Mar. 20	Mar. 27	Feb. 27	Mar. 6	Mar. 13	Mar. 20	Mar. 6	Mar. 13	Mar. 20	Mar. 27
	Number of reported cases in States				Death rate (annual basis) from influenza and pneumonia in 95 large cities, per 100,000 population				Death rate (annual basis) from all causes in 86 large cities per 1,000 population			
All regions:[2]												
1937 [2]	15,134	11,131	8,852	6,359	224	197	190	166	13.3	13.2	13.0	12.9
1934 [3]	3,341	2,971	2,754	2,193	171	175	173	153	13.0	13.4	12.7	12.7

[1] For similar tables see PUBLIC HEALTH REPORTS for Jan. 15, 1937, p. 68; Jan. 29, p. 126; Feb. 12, p. 190; Feb. 19, p. 210; and Mar. 19, p. 327.
[2] No reports were received from Mississippi, Nevada, up-State New York, Pennsylvania, and Virginia. New York City is included.
[3] Reported cases for the corresponding weeks of 1934, the winter of 1933–34 being one of average influenza incidence.

Meningococcus meningitis.—For the 4 weeks ended March 27, 772 cases of meningococcus meningitis were reported. Although this number was about 65 percent of that for the corresponding period in 1936, it was approximately 20 percent in excess of the incidence in 1935. Since the beginning of 1935 this disease has been unusually prevalent. In 1934, 1933, and 1932 the numbers of cases for this period were 225, 393, and 296, respectively.

The high incidence has prevailed in all sections of the country. During the current period, however, practically every section reported fewer cases than during the comparable period of the preceding year, and in all regions, except the South Atlantic and South Central, the incidence had dropped to the average level of the years 1932–34, inclusive. In those regions the incidence was below that of last year, but it was still somewhat above the normal expectancy. These same areas reported a high incidence during this period in 1936. In the South Atlantic region, Virginia, West Virginia, and Florida reported 46, 32, and 25 cases, respectively, and in the South Central regions, Kentucky reported 86 cases, Alabama, 55, and Texas, 41. These figures are considerably above the average for these States for this period for the years 1932–34. Several regions reported decreases from the figures for the preceding 4-week period, but as the peak of this disease for the country as a whole has usually been reached during April, a still higher level is probably in prospect. In 1929 the total number of cases for this period was 1,257, with a gradual decline to 225 for the corresponding 4 weeks in 1934—a period of 6 years. It is possible that the year 1936, with a total of 1,172 cases for this period, may be the peak year of another high incidence of this disease during these 4 weeks.

Measles.—The current incidence of measles is the lowest in recent years, with 32,967 cases reported, or about 75 percent of last year's figure for the corresponding period. The only region showing an excess over 1936 is the South Atlantic, where the number of cases (5,469) was about 2.5 times that of last year. The incidence in the North Atlantic regions closely approximated that of last year, but in all other regions the disease was considerably less prevalent. In 1935 and 1934 the numbers of cases reported for the country as a whole during this period were approximately 132,000 and 129,000, respectively, while the average for recent years with a normal incidence of measles is about 55,000 cases.

Scarlet fever.—At the present time scarlet fever is less prevalent than during the corresponding period in each of the 2 preceding years. The number of cases (30,157), however, was somewhat above the average for this period in recent years. In 1936 and 1935 approximately 35,000 and 32,000 cases, respectively, were reported, while the average for the years 1929–34, inclusive, was about 25,000 cases. The North Central regions continued to report a large number of cases; in the West North Central region the number of cases (5,961) was the highest for this period in the 9 years for which these data are available. The South Atlantic region reported the smallest number of cases in recent years, and in other regions the incidence stood at about the seasonal expectancy.

Diphtheria.—Diphtheria incidence continued well below that for recent years, 1,776 cases being reported, as compared with 2,851, 2,533, and 2,139 cases for the comparable period in 1934, 1935, and 1936, respectively. Compared with the corresponding period in 1936, the North Atlantic and East South Central regions reported practically the same incidence, while in other regions the disease was considerably less prevalent.

Poliomyelitis.—The number of cases of poliomyelitis (78) reported during the current 4-week period was the same as that for the corresponding period in 1936, which was about the normal incidence for this season of the year. Of the various geographic regions, the East North Central, South Atlantic, and South Central reported slight increases over the totals for the corresponding peiiod in 1936, while the North Atlantic, West North Central, and Western regions reported decreases.

Typhoid fever.—For the 4 weeks ending March 27 the reported cases of typhoid fever totaled 423, as compared with 362, 385, and 508 for the corresponding period in 1936, 1935, and 1934. The South Atlantic and South Central regions reported increases over the corresponding period in 1936; the North Atlantic and East North Central regions reported decreases; and in the West North Central and

Western regions the incidence was practically on a level with that of last year.

Smallpox.—The number of cases of smallpox reported (1,920) was about 30 percent in excess of that for the corresponding period in 1936. In the Mountain and Pacific region the excess was approximately 65 percent; in the East North Central, 50 percent; in the South Central region, 23 percent; and in the West North Central, 15 percent. Only 5 cases were reported from the South Atlantic States and 5 (all in New York) from the North Atlantic regions. States mostly responsible for the high incidence were as follows: Missouri (303 cases), Kansas (145), Oregon (125), Illinois (120), Iowa (114), and Montana (97); almost three-fourths of the total number of cases occurred in those 6 States. For this period in 1935, 1934, and 1933 the numbers of cases for the entire reporting area were 695, 622, and 810, respectively.

Mortality, all causes.—The average mortality rate from all causes in large cities for the 4 weeks ended March 27, based on data received from the Bureau of the Census, was 13.1 per 1,000 inhabitants (annual basis). For the corresponding period in the years 1936, 1935, and 1934 the rate was 14.2, 12.7, and 12.8, respectively.

STUDIES ON TRICHINOSIS

I. The Incidence of Trichinosis as Indicated by Post-Mortem Examination of 300 Diaphragms

By Maurice C. Hall, *Professor of Zoology*, and Benjamin J. Collins, *Laboratory Aide, Division of Zoology, National Institute of Health, United States Public Health Service*

INTRODUCTION

The diaphragms of patients dying in hospitals have been examined by a number of workers at various places in the United States with a view to ascertaining the extent to which trichinae are present in our population. At present, data are available on a rather large number of cases, but for various reasons it has seemed worth while to conduct a further study of this nature. For one thing, the hospitalized cases in Washington represent to an unusual extent a cross section of a rather large number of the population groups of the United States, and not just a cross section of a local or relatively homogeneous population. Another consideration is the fact that the previous studies have utilized but one of two available techniques for the examination of diaphragms, and certain limitations in either technique make the use of both techniques desirable. Still another consideration is the general lack of precise quantitative elements in almost all of the previous studies, and there are certain conclusions to be drawn from quantitative studies that cannot be drawn from studies not containing

quantitative elements. Further, numerous data which might be correlated with the occurrence of trichinae are generally lacking in previous studies, and we have attempted to obtain these data in our studies. Finally, a larger series of cases than has been reported is desirable to make the results statistically significant, and the present report on a series of 300 cases is a preliminary report on a continuing study in which we expect to cover a series of 1,000 cases as a base group, with certain population groups carried on beyond this base group. We use percentages, not with the idea that they are very accurate, but with the idea that they correctly represent trends.

MATERIAL AND DATA

The present study is part of a group research study on trichinosis in which the examination of diaphragms has been the major activity of one of us (B. J. C.), who made the large majority of the examinations reported here. A small minority of cases were examined by the other author and other workers in the Division of Zoology. Our material was obtained from the following hospitals, all in Washington, D. C., with one exception: Walter Reed General Hospital, covering a military population primarily associated with activities by land; the United States Naval Hospital, covering a military population associated with activities by sea; the United States Marine Hospital of the Public Health Service at Baltimore, Md., covering, among others, a civilian population associated with activities by sea; the Veterans' Administration Facility, Mt. Alto, covering, among others, a population which was at one time in a military group but which is primarily and most of the time a civilian group; St. Elizabeths Hospital, covering a population of mentally deranged cases which are commonly hospitalized for periods of years as opposed to the relatively short periods of hospitalization in hospitals in general; Freedmen's Hospital, covering a representative Negro population; Gallinger Municipal Hospital, covering cases of relatively low economic-social status from the mixed population of the District of Columbia; Children's Hospital, covering a group of children up to 13 years of age; and George Washington University Hospital, Georgetown University Hospital, and Garfield Hospital, covering cases of somewhat higher economic-social status than those from Gallinger and coming from the general population of Washington. The first five of these hospitals have patients from all over the United States, and the others receive patients from Washington, which, more than any other city in this country, has a population representing practically all parts of the United States.

With these cases as a basis, we expect to be able to study the correlations of the incidence of trichinae with such data as military or civilian status, association with land and sea, high and low economic-social status, mental derangement associated with long hospitalization,

and the absence of any such derangement associated with prolonged hospitalization, as well as to study correlations with sex, race, and age. These correlations are to be considered in a second paper by Hall and Collins. At the present time such correlations can be made only tentatively, but with more adequate data somewhat precise correlations may be expected. We are greatly indebted to the following for supplying diaphragms and data in our cases: the administrative officers of the various hospitals; Lt. Col. F. H. Foucar and Miss R. L. Clarke, at Walter Reed; Capt. U. R. Webb, Capt. H. W. Smith, Comdr. Paul W. Wilson, and Comdr. Harold E. Ragle, at the Naval Hospital; Dr. T. B. H. Anderson and Dr. H. L. Wollenweber, of the United States Marine Hospital at Baltimore; Dr. Lewis G. Beardsley and Dr. Robert Keilty at Mt. Alto; Dr. William A. White, Dr. K. H. Langenstrass, Dr. H. C. Wooley, Dr. S. A. Silk, and Dr. Nathan N. Root, at St. Elizabeths; Dr. Robert S. Jason, Dr. H. A. Poindexter, and Dr. Chas. R. Drew at Freedmen's; Dr. H. H. Leffler and Mr. R. R. Boyle, at Gallinger; Dr. J. W. Lindsay, at Children's and Garfield; Lt. Comdr. Roger M. Choisser, at George Washington, and Col. E. R. Whitmore, at Georgetown.

METHOD

The method used by us in examining diaphragms for trichinae was as follows:

In the first 31 cases an indeterminate amount of muscle was examined microscopically, and was weighed if trichinae were found. Subsequently, one gram of muscle, either from the muscles near the tendinous portion or partly from this region and partly from other regions of the diaphragm, was first weighed; the muscle was then cut into small pieces, placed between relatively heavy glass plates about 4.5 millimeters thick, and then compressed by two bolt and nut arrangements acting directly on the glass or on a metal frame which, in turn, acted on the glass. This press preparation was then examined microscopically. All trichinae found were recorded directly in terms of trichinae per gram, and a notation made as to whether the cysts were or were not calcified, and whether the trichinae were alive or dead.

The remainder of the diaphragm was weighed, ground in a meat grinder, and digested in an incubator room in artificial gastric juice (0.5 percent pepsin, 0.7 percent hydrochloric acid, and 1 liter of water). As a rule, the largest amounts which were multiples of 25 or 50 grams were used for the digestion, and if the amount was less than 50 grams all the material available was digested. The maximum amount, used in many cases, was 200 grams; the average for 300 cases was 113 grams. After digestion for approximately 24 hours, the material was

poured on the screen, using 80- to 100-mesh screens, in a Baermann apparatus, and allowed to stand for an hour or longer, and the material coming down in the funnel was then drawn off and examined for trichinae. If the findings were positive, additional amounts were examined until they were negative. Beginning with the thirty-fifth diaphragm, all of the fluid in the funnel was then drawn off and the apparatus was again filled with water warmed to 45° C.; after an hour the material coming down was drawn off and examined for trichinae. In five cases additional numbers of trichinae were found by this procedure. The screen was examined for any trichinae that might have remained on it, and in two cases trichinae were found. In 210 cases the material remaining on the screen from the Baermann examination was dried on absorbent paper, and 1 gram of this residue was examined microscopically for trichinae. Calcified trichinae were found in eight samples of this material, all of them previously positive by the direct microscopic examination.

LIMITATIONS OF METHODS

In the previous literature on examinations of diaphragms for trichinae, the investigators have used either direct microscopic examination alone or the digestion-Baermann method alone, or have merely reexamined a part of their positive material by a second method. Queen (1931) reexamined part of his series of 75 positives as ascertained by digestion, sectioning 73 and making press preparations of 29. Any failure to use both the direct microscopic and the Baermann method is practically certain to miss some positive cases. Microscopic examination of any given amount of material is likely to miss approximately half of the cases in which there is an average of only 1 trichina for the given amount of material examined, and will miss almost all of the light cases in which there is an average of less than 1 trichina present for any given amount of material examined, regardless of whether the trichinae are alive or dead. In other words, microscopic examination will probably miss cases of light infestation with either live or dead trichinae. On the other hand, the use of the digestion method will detect the presence of live trichinae rather dependably even when they are present in very small numbers; but since the efficiency of the Baermann apparatus depends for its effect on the movement of live worms and the effect of gravity in bringing down these moving worms, the digestion method is of little value for the detection of dead trichinae unless these are present in numbers large enough to insure that some of them will land directly on the screen and fall through.

Our study of incidence by the use of two techniques affords an opportunity to check the value and limitations of each technique, and

to make a very tentative estimate of the probable error in previous studies, in all of which only one of these techniques was used. The performances of the microscopic technique and of the digestion-Baermann technique, as shown in table 1, were as follows:

Microscopic technique.—This technique detected 27 of 41 positives, or 65.85 percent, and failed to detect 14 positives, or 34.15 percent; it failed in slightly more than one-third of the positive cases. Consequently, if the reports in the literature of microscopic examinations alone had been based on the examination of 1 gram of diaphragm muscle, as ours was, the incidence reported would be approximately 50 percent greater than the figure reported. Unfortunately, weighed amounts were not used by other workers nor did they always use the diaphragm, and so we cannot apply our correction figure accurately, but we can say with considerable assurance that their incidences are too low, and may surmise that if all their figures are combined the true incidence for the totals might be approximately 50 percent greater than the average reported. If we take the figures from table 3, so far as they are based on microscopic examinations alone, 5 papers report a total of 676 examinations with 51 positives, or an average of 7.5 percent. Applying our correction figure tentatively, and with no assumption that it will be at all accurate, we have an indicated incidence of 11.3 percent. This figure is probably closer to the actual incidence than that given.

In our total of 41 positives, the microscopic technique and the digestion-Baermann technique were both positive in only 15 cases, or 36.59 percent, indicating that both techniques will be in agreement in only approximately this percentage of all positives present. The nature of the cases which will be detected and of those which will be missed by the microscopic technique alone is indicated by a consideration of the nature of the infestations, whether with live, mixed, or dead trichinae. Out of 13 cases in which we found only live trichinae, about 31.7 percent of our positives, the microscopic examination detected 3 cases, or 23.1 percent, and missed 10 cases, or 76.9 percent. Out of 18 cases in which we found only dead trichinae, about 43.9 percent of our positives, the microscopic examination detected 16 cases, or 88.9 percent, and missed 2 cases, or 11.1 percent. Out of 10 cases in which we found both live and dead trichinae present, about 24.4 percent of our positives, the microscopic examination detected 8 cases, or 80 percent, and missed 2 cases, or 20 percent. All of the cases missed were light infestations with less than 1 trichina per gram, thereby supporting the statement already made that the microscopic examination will miss almost all of the light infestations, whether with live or dead trichinae, usually missing those present in amounts of less than 1 trichina per gram.

Digestion-Baermann technique.—This technique detected 29 of 41 positives, or 70.7 percent, and failed to detect 12 positives, or 29.3 percent. Consequently, if the reports in the literature of digestion-Baermann examinations alone had been based on the examination of the entire diaphragm, so far as it could be examined in multiples of 25 or 50 grams, and of all in which the amount was less than 50 grams, the incidence reported would be approximately 23.3 percent greater than the figure reported. These amounts were not used by other workers, and so we cannot apply our correction figure with any accuracy, but we can be sure that their figures for incidence are too low. If we take the figures from table 3, so far as they are based on the digestion-Baermann examination alone, 3 papers report a total of 802 examinations with 130 positives, or an average of 16.2 percent. Applying our correction figure tentatively, we have an indicated incidence of about 23 percent. This figure is probably closer to the actual incidence than that given.

The nature of the cases which will be detected and of those which will be missed by the digestion-Baermann technique alone is likewise indicated by a consideration of the nature of the infestations. Out of 13 cases in which we found only live trichinae, and 10 cases in which we found both live and dead trichinae, the digestion-Baermann examination detected every case, or 100 percent. Out of 18 cases in which we found only dead trichinae, this method detected only 6 cases, or 33.3 percent, and missed 12 cases, or 66.7 percent. In the cases missed by the digestion-Baermann method, trichinae were found by the microscopic method in numbers from 1 to 54 per gram, with an average of approximately 11 per gram. In the 6 cases detected by the digestion-Baermann examination, our calculation on number of trichinae shows less than 1 per gram; but in the 4 cases in which the microscopic examination also was positive the numbers found are 3, 5, 21, and 993 per gram. The evident explanation is that the dead trichinae found by the digestion-Baermann method came down in the Baermann funnel through the accident of landing on the screen. Assuming that we had 100-gram samples of diaphragm, even our lightest microscopic finding, 3 per gram, would mean that with approximately 300 trichinae present a couple might fall on the screen and come through, thus accounting for our finding of 0.02 trichina per gram in this case. Similarly, with 993 per gram found by the microscope, only 23, out of an indicated 99,300 in the sample, came through in the Baermann funnel. These figures assume uniform distribution of the trichinae in the sample, but presumably it is not uniform.

These findings establish our statement that the digestion-Baermann examination will miss dead trichinae, as a rule, unless they are present in numbers sufficiently large to insure that some of them will fall on the screen and come through. In the two cases missed by the micro-

scope and detected by the digestion-Baermann method, the true figures for trichinae per 100 grams are evidently nothing like the 1.3 and 3 trichinae actually estimated. In the 4 cases in which dead trichinae were found by both methods, the comparative figures in terms of trichinae per 100 grams are for the Baermann and the microscope, respectively, 1 and 2,100, 3 and 300, 4 and 500, 23 and 99,300, ranging from 100 to 4,317 times as great for the microscope as for the Baermann. Taking the lowest figure, 100, as our multiplier, our findings of 1.3 and 3 trichinae per 100 grams would represent a theoretical minimum of 130 and 300 trichinae per 100 grams, and the failure of the microscopic examination to detect these cases was probably merely an example of the law of chance operating to produce a failure when the odds were 130 to 100, or 300 to 100, in favor of our finding them.

If we exclude from the total of 1,778 cases in table 3 the 300 cases reported by us and based on two techniques, leaving 1,478 cases, and exclude from 222 positives our 41 positives, leaving 181 positives, and correct the number of positives by microscopic technique alone and by digestion-Baermann technique alone, we have an indicated 260 positives, or an incidence of 17.6 percent. Combining this with our figure would give a total of 1,778 cases with 301 indicated positives, or an incidence of approximately 17.5 percent. We cannot conclude very much from figures of this sort or of this size, and especially as manipulated on tentative assumptions which rest on an admittedly inadequate basis. However, we are looking for the indicated incidence of trichinosis on the basis of what data are available, and the indicated incidence of over 17 percent is probably lower than the true incidence.

We have already shown that neither the microscopic nor the digestion-Baermann technique will pick up very light infestations with dead trichinae except incidentally and accidentally whenever a positive turns up, with the odds against its turning up. We find more cases with only dead trichinae (18 positives) than with only live trichinae (13 positives), in spite of the fact that by means of the digestion-Baermann method we are much more certain to detect live trichinae. Hence the likelihood of missing some cases with only dead trichinae, especially light cases, is very great, and all figures, including our own, are evidently too low for this reason. In our infestations with live trichinae, light infestations predominate, and one might assume that for every case of light infestation with live trichinae there would be a corresponding light infestation with dead trichinae which was not detected. However, this assumption cannot be safely made at present, since there is the possibility that trichinae in heavy infestations may calcify and die much more rapidly than trichinae in light infestations, a possibility which finds some evidence

in the fact that dead trichinae predominate in the heavy infestations found.

As regards the use of the diaphragm alone as a basis for studies, we note that Thornbury (1897), in a study of 1,043 cases of trichinosis in swine, found trichinae in the diaphragm in 76.6 percent of his cases, leaving 23.4 percent of positive cases, or almost one-fourth, in which the diaphragm sample, his best indicator, was negative in spite of positive findings in loin or neck muscles or both. Evidently, then, all incidences based on microscopic studies of diaphragms are too low on the basis of this finding alone and aside from other considerations already given.

We have tested the possibility of detecting light cases of infestation with dead trichinae by the use of long wave-length X-rays, also termed soft X-rays or Grenz rays, of low penetrating power. So far our attempts to find calcified trichinae by direct observation have been unsuccessful. We have not tried photography by such methods as are described by Sherwood (1934), but a grossly infested specimen, with calcified trichinae, was examined in this way by the research laboratory of the Eastman Kodak Co. and an excellent photograph and an enlargement, sent to us by Dr. R. B. Wilsey, show the cysts very well. However, this method of examination does not seem applicable to the routine examination of large numbers of diaphragms, especially since any calcified areas would have to be located, excised, and examined microscopically.

INCIDENCE

The details of our findings are presented in table 1. The findings, as already noted, indicate that the previously published findings of other workers, based on only one of these methods, give too low an incidence, but as these workers, with the exception of Queen (1931), who used "approximately" 50 grams, and McNaught and Anderson (1936), who used 50 grams, did not use weighed amounts of diaphragm, our correction figures cannot be applied to them except in a tentative way. All findings, including our own, are evidently low, since positive findings of trichinae are rather dependably correct, the trichinae whether alive or dead, uncalcified or calcified, being practically unmistakable, whereas negative findings are more or less inconclusive.

TABLE 1.—*Findings for positive cases*

Positive no.	State of trichinae	Findings		Number per gram	
		Microscopic	Digestion	Microscopic	Digestion
1	Live	Negative	Positive	0	0.187
2	Dead	Positive	Negative	600	0
3	Live	Negative	Positive	0	.006
4	Dead	Positive	Negative	54	0
5	Live	do	Positive	5	.48
6	Mixed	do	do	85	.04
7	Dead	do	Negative	12	0
8	Live	do	Positive	1	.04
9	do	Negative	do	0	.04
10	Dead	Positive	Negative	2	0
11	Live	Negative	Positive	0	.035
12	Dead	Positive	do	21	.01
13	do	Negative	do	0	.013
14	Mixed	do	do	0	.08
15	Live	do	do	0	.133
16	Dead	Positive	Negative	14	0
17	do	Negative	Positive	0	.03
18	Live	do	do	0	.041
19	Dead	Positive	do	3	.02
20	do	do	Negative	2	0
21	Mixed	do	Positive	47	1.2
22	Dead	do	do	5	.04
23	do	do	Negative	1	0
24	do	do	do	3	0
25	Mixed	do	Positive	5	2.12
26	Live	Negative	do	0	.43
27	do	do	do	0	.03
28	Dead	Positive	do	993	.23
29	do	do	Negative	11	0
30	Mixed	do	Positive	16	.39
31	do	do	do	2	.06
32	Live	Negative	do	0	.08
33	Mixed	do	do	0	.26
34	do	Positive	do	3	1.77
35	Live	Negative	do	0	.02
36	Dead	Positive	Negative	3	0
37	do	do	do	1	0
38	do	do	do	12	0
39	Mixed	do	Positive	7	.02
40	do	do	do	1	.35
41	Live	do	do	2	.12

Number with live trichinae only, 13, or 31.7 percent (Queen (1931), by digestion only, found about 61.3 percent).
Number with dead trichinae only, 18, or 43.9 percent (Queen found about 25.3 percent).
Number with live and dead trichinae, 10, or 24.4 percent (Queen found 13.3 percent).

Using the quantitative data obtained, we are in a position to make some tentative estimates as to the severity of infection in the various positive cases found in our examinations. It is impossible to do this very accurately, so far as clinical correlations are concerned, since the literature, so far as we have examined it, does not afford an adequate background, and there are obvious possibilities of error of other sorts. As yet we do not have adequate data as to the distribution of trichinae in the diaphragm, the one observation that the literature seems to agree on being that the trichinae are most numerous in the muscles near the tendinous portions of the diaphragm. Thus, the finding of 1 trichina per gram in a microscopic examination of 1 gram of diaphragm muscle does not indicate too dependably that the entire diaphragm, if it weighs 100 grams, therefore contains 100 trichinae, although this figure may be used as an estimate with reservations to

the effect that the figure cannot be taken too seriously. Translating such an estimate into terms of number of trichinae present in the individual patient is still more uncertain. The diaphragms sent to us were often incompletely removed or were only samples. The proportion of weight of muscles to entire body weight is a variable in different individuals and in any given individual from time to time. If we assume, for the purposes of rough estimate, that the somatic musculature weighs approximately half the total body weight, it is still necessary to use a somewhat dependable factor indicating the relative proportion of trichinae in the diaphragm to the total number present in the body, and while such factors occur in the literature, they are not entirely applicable for our purposes. A readily available figure is given by Ostertag (1919), who states that Kuehn, on an examination of 3 hogs moderately infested with trichinae, found 25.3 percent of the trichinae present to be in the diaphragm. It is not safe to assume that the findings on three moderately infested hogs are generally applicable even to hogs, much less to human beings; but for tentative estimates, and until we obtain adequate data, one might assume that the number of trichinae present in an entire diaphragm represented approximately one-fourth of the total number present in the body. However, the extensive data reported by Thornbury (1897), on samples from 1,043 cases in swine, are by no means in agreement with Kuehn's findings.

Correlations of the number of trichinae per gram with the presence or absence of clinical symptoms cannot be made because of a practically complete lack of basic data, and also because the clinical picture of trichinosis is highly variable, largely unstudied and unknown, contrary to the general assumption. In general, the over-simplified classical picture of trichinosis as given in the text books is the only form of the disease which is usually considered, and even in cases in severe epidemics, on which the classical picture is based, there are wide departures from the classical syndrome.

In our series of 41 positive cases none had a history of any previous diagnosis of trichinosis, and this is true for all of the 222 positive cases reported in table 3. Yet in 1 of our cases (no. 28) there were between 900 and 1,000 trichinae per gram of diaphragm muscle. Chandler (1926) notes an epidemic in Portland, Oreg., in which the sausage responsible for the outbreak had over 2,000,000 larvae per pound (a little over 900 per gram), and an Italian who died in the epidemic had a number of larvae "even greater." While the precise number per gram in the human victim is not given, it seems safe to assume that, in this fatal case, the number of trichinae was comparable to the number in our heaviest case; yet in this latter case, with rather better than the usual anamnesis covering it, the records show only measles and a gunshot wound, the patient denying other illnesses.

Williams, in his cases, specifies one-third of the infestations as severe, one-third as moderate, and one-third as mild, but there was no diagnosis of trichinosis connected with even the 9 severe cases. As a base figure for extremes of infestation, we note that Schumann and Ludwig, cited by Ostertag (1919), report the extraordinary figure of almost 4,000 (actually 3,961) trichinae per gram for a hog, and that Roth (1935) reports 10,000 per gram in an artificially infected guinea pig.

INTENSITY OF INFESTATION

As a basis for further consideration we may divide our cases into groups of lighter to heavier infestations, accepting the direct microscopic findings per gram whenever positive, because of their direct and positive character, and accepting the digestion-Baermann findings per gram for the other cases, arbitrarily making the groups shown in table 2.

TABLE 2.—*Positive groups on a basis of trichinae per gram*

Group no.	Larvae per gram	Number of cases	Percent	Number in various states		
				Live	Mixed	Dead
1	Less than 1	14	34	10	2	2
2	1 to 10, inclusive	16	39	3	5	8
3	11 to 50, inclusive	7	17	0	2	5
4	51 to 100, inclusive	2	4.9	0	1	1
5	101 to 500, inclusive	0	0	0	0	0
6	501 to 1,000, inclusive	2	4.9	0	0	2
7	Over 1,000	0	0	0	0	0

From the table it is evident that in group 1, infestations with less than one larva per gram, the large majority of cases show only live larvae, whereas in all other groups, with one or more larvae per gram, mixed infestations predominate over those with live larvae, and infestations with dead larvae predominate over both other groups. Group 2, with next to the lowest number per gram, is the only group other than group 1 showing any cases with only live larvae present, and these constitute only a small percentage of that group. One may readily explain the small number of cases showing less than 1 larva per gram and with only dead larvae present, as has already been indicated, by the fact that the mathematical chance of finding such infestations by direct microscopic examination is exceedingly small, and that the digestion-Baermann examination has little utility in such cases, but why do 8 cases with only dead larvae present, and present in such relatively large amounts as 11 to almost 1,000 larvae per gram, have no counterpart in the form of cases with only live larvae present in similarly large numbers? The chance of oversight with such numbers can be ruled out, as either the direct microscopic or digestion methods could be depended on to find these cases.

The age factor alone seems to have little bearing on the case, since live trichinae alone, in infestations from less than one per gram up to 10 per gram, occur in the various decades of age as follows: First, 1 case; third, 2 cases; fourth, 3 cases; fifth, 3 cases; sixth, 3 cases; seventh, one case. Why these 13 light live infestations, occurring in six decades of age distributed from infancy to the sixties, are not matched by at least some heavier live infestations is not clear to us from the data and background available. It might be explained, as one possibility, on the theory that the rapidity with which trichinae die and calcify is proportional to the degree of infestation; but this appears to be purely theoretical at present, since we know of no data in the literature which would afford substantial evidence for this theory. However, this theory should be considered as new data are obtained.

The only other quantitative study with which we can make comparisons is that of McNaught and Anderson (1936). Since they used only the digestion method and report that "Living trichinae were found in all the positive cases", we can assume that they had both live and mixed infestations, and by reducing their figures to larvae per gram we can compare them with our figures for 23 live and mixed cases as obtained by digestion (table 1). On that basis we have the following: Less than 0.4 larva per gram, 79 percent (M. and A.) or 78.3 percent (H. and C.; 18 cases); 0.4 to 2 larvae per gram, 12.5 percent (M. and A.) or 17.4 percent (H. and C.; 4 cases); over 2 to 76 larvae per gram, 8.5 percent (M. and A.) or 4.3 percent (H. and C.; 1 case). These figures are in agreement in showing that, so far as live trichinae are concerned, very light infestations are the rule (between 75 and 80 percent), that slightly heavier infestations are much scarcer (between 10 and 20 percent), and that moderate infestations are a very small group (less than 10 percent).

On the basis of table 2, one can make only a tentative and subjective estimate as to the severity of the infection and the probable occurrence of visible symptoms in the various groups. However, it seems safe to say that in infestations with distinctly less than 1 larva per gram, especially the cases with less than 10 larvae for each 100 grams of diaphragm muscle, symptoms are either absent or negligible, and it seems equally safe to say that in infestations with over 100 larvae per gram there must be pronounced clinical symptoms, including at least part of the features of the classical picture of trichinosis, and that these cases are definitely severe cases. Over the range between these two extremes there are probably disease symptoms of a polymorphic nature, probably more or less atypical, which symptoms are not recognized as indicative of trichinosis for the reason that this group of cases is an unstudied group. Until we have a relatively large amount of data from the clinician, pathologist, and parasitologist,

with some quantitative findings in known clinical cases, and these data are intelligently coordinated and interpreted, we shall probably fail to diagnose these cases correctly. Presumably they will include vague cases diagnosed as acute bacterial infections, rheumatic fever, intercostal neuritis, intestinal influenza, eye diseases of various sorts, heart diseases of various sorts, various derangements of the nervous system, and other conditions, depending on the point at which the parasite's invasion finds the weakest spot or produces the most noticeable derangement.

CORRELATIONS WITH PUBLISHED FINDINGS

Having recorded our observations on incidence, it is in order to pick up the data afforded by the published literature as a basis for some conclusions as to the indicated prevalence of trichinae and trichinosis in the United States. These data are summarized in table 3.

TABLE 3.—*Incidence in the United States of trichinae found post mortem, as reported in the literature*

Author	Date	Place	Number of examinations	Positive	Method	Percent
Kerber [1]	(?)	San Francisco, Calif.	13	0	Microscopic	0
Whelpley	1891	St. Louis, Mo.	20	1	do.	5
Thornbury	1897	Buffalo, N. Y.	21	3	do.	14.3
Williams	1901	do.[2]	505	27	do.	5.35
Queen	1931	Rochester, N. Y.	344	59	Digestion	17.15
		Boston, Mass.	58	16	do.	27.6
Riley and Scheifley	1934	Minneapolis, Minn.	[3] 117	20	Microscopic	17.09
Hinman	1936	New Orleans, La.	[4] 200	7	Digestion	3.5
McNaught and Anderson.	1936	San Francisco, Calif.	200	48	do.	24
Hall and Collins (this paper).		Washington, D. C., and Baltimore, Md.	300	41	Microscopic and digestion.	13.67

[1] Cited by Williams; not seen.
[2] Cases from Buffalo and elsewhere in New York State, and from Philadelphia, Baltimore, and Denver.
[3] The "1 series of 50" mentioned by Riley and Scheifley is part of their series of 117 cases, not an additional series as some writers have thought (confirmed by Dr. Riley in correspondence).
[4] Cases of 25 infants, all negative, omitted from this total.

Total number examined, 1,778. Total found positive, 222. Arithmetical percent positive, 12.5.

The percentage obtained here, 12.5 percent, cannot be taken on its face value either as an average or as an index, without reservations. As an average of unweighted figures it cannot be used as a basis for precise mathematical treatment, and no such treatment is attempted here. Aside from this fact, there are several variables in the base figures, such as differences in method, differences in amount of material examined, and changing factors over a period of almost 50 years so far as American food habits and methods of raising swine are concerned. Nevertheless, these 1,778 necropsy results for 11 cities widely distributed over the United States indicate a high incidence of trichinae throughout the population of the United States. Our material was from 11 hospitals, McNaught and Anderson's from 5 hospitals,

and others' apparently from 8 hospitals, or a total of 24 hospitals. The flaw in the percentage, as previously noted, is not that it is too high, but that it is too low.

As regards the use of the direct microscopic method used by 5 workers in a total of 676 cases, with 51, or about 7.5 percent, positive, our findings indicate that the use of this method alone will miss approximately 34 percent of positive cases, and that the use of both methods in these series, assuming that other factors are the same—which they are not—would have given a figure closer to 11 percent. Thornbury (1897), in a study of 1,043 cases of trichinosis in swine, found trichinae in the diaphragm in 76.6 percent of his cases, leaving 23.4 percent of positive cases, or almost one-fourth, in which the diaphragm sample, his best indicator, was negative. Evidently, then, all incidences based on microscopic studies of diaphragms are too low. Our correction figure, 34 percent missed, is based on 2 techniques on diaphragms only, whereas his figure, 23.4 percent missed, is based on microscopic technique only, on diaphragm, loin, and neck.

As regards the use of the digestion-Baermann method used by three workers in a total of 802 cases, with 130 positives, or 16.2 percent, our findings indicate that the use of this method alone—again assuming that other factors are the same—will miss approximately 29 percent of positive cases, and, therefore, that the use of both methods in these series would have given a figure closer to 23 percent. For the entire series of 1,778 examinations, our findings indicate that, with the use of both methods, there would have been approximately 301 positives, or approximately 17.5 percent.

The above calculation assumes that, aside from method, procedures were comparable. Actually, they are not comparable. As regards the amount of material examined, we note the following: We have not seen Kerber's paper; Whelpley and Thornbury say nothing about amounts; Williams used samples, usually 3 centimeters long by 1 to 2 centimeters wide and thick, including, usually, diaphragm muscle; Riley and Scheifley used, on an average, 5 square centimeters of compressed muscle to a slide; Hinman used small pieces, about 2 inches square, of diaphragm muscle; Queen used "approximately 50-gram portions of muscle" from the diaphragm; McNaught and Anderson used 50 grams of diaphragm muscle. Obviously, there are many variables here. The present writers examined 1 gram directly, and used for digestion, in the large majority of cases, as much diaphragm as could be obtained and weighed in multiples of 25 and 50 grams, unless there were less than 50 grams available, in which case all the available material was used, and the use of these amounts, in many cases 200 grams and an average of 113 grams, or much more than other workers used, probably resulted in finding a higher percentage

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of positives than would have been found by using the smaller amounts used by other workers.

As regards factors affecting pork as food, the present status is somewhat different from that of the period covered in the papers by Williams and his predecessors. It is quite probable that the numerous cases of light infestations, with less than 10 larvae per 100 grams of diaphragm muscle, of which there were 10, or almost 25 percent, among our 41 positive cases, are cases of a type which was very rare previous to the early days of this century. For thousands of years the slaughter of swine has been conducted on a small-scale basis, from slaughter of an individual animal on the farm or elsewhere to the slaughter of a few animals at some such point as the country slaughter house. Under such conditions, not only pork but also pork products (sausage, etc.) originated, as a rule, with individual animals and were either free from trichinae or definitely well supplied with trichinae and definitely dangerous, as a rule. Since the meat inspection figures cited by Ransom (1915) for trichinae in American export swine, for the period 1898–1906 during which microscopic examinations were made and reports on live trichinae published, showed 1.41 percent of over 8,000,000 swine to be infested with live trichinae, anyone at that time eating raw or undercooked pork products was usually eating pork from only one hog, and had only 1.41 chances in 100 of becoming infested with trichinae, but the chances were probably 100 to 1 that if a person became infested he would have a clinical case of trichinosis. Today it is no unusual thing for the pork trimmings from 100 or more hogs to be made up into sausage or some other pork product, in one of our large packing establishments. The effect of this appears to have been stated first by Ransom (1915). If we have today approximately the same percentage of trichinous swine, as Hall's (1935) report and Schwartz's (1936) report indicate, the chance of becoming infested with trichinae from eating raw or undercooked sausage or similar pork products is vastly greater than it formerly was, since the trimmings from one trichinous hog will be mixed with the trimmings from 99 uninfested hogs in such a way that practically all of the trichinae present will be more or less uniformly distributed throughout the product.

The chance of swallowing some live trichinae in raw or improperly cooked pork products may be something less than 100 to 1; but if they are swallowed, the chances are great that they will not produce clinical trichinosis because of the dilution factor. Taking all of our 41 cases as a basis, it appears that on that basis, infestation from all sources in our series resulted in zoological nonclinical trichinosis in about 25 percent of our cases (those with less than 10 larvae per 100 grams), in what must have been severe clinical trichinosis in at least

4.9 percent of our cases (those with over 100 larvae per gram), and in clinical trichinosis, more or less atypical, in about 70 percent of our cases.

CORRELATIONS OF INCIDENCE WITH REGIONAL DISTRIBUTION

An inspection of table 3 with reference to incidence and geographic distribution suggests some interesting correlations. In general, writers have attempted no explanation for their findings of higher or lower incidence as compared with findings elsewhere, but it seems advisable to open up a consideration of this subject with a theory which can be supported by some facts, thereby focusing attention on the explanation of the variations in incidence. It will be noted that the incidence is highest in Boston and San Francisco, and that the next highest incidences are in regions north of Washington, D. C., and that all these incidences outside of Washington are evidently too low by comparison with the Washington figures for the reason that they were obtained by only one method, thereby ensuring that one group of positives would be missed rather generally. An extension of these findings, that the incidence is high at Eastern and Western seaports, is the finding that the lowest incidence is that from the far South at New Orleans. From the data available to us we are inclined to think that any attempt to correlate these findings with the food habits of persons in these areas, the association that one would naturally think of first, would be unsuccessful.

The correlation which we believe exists is between incidence of trichinae in persons and incidence of trichinae in the swine from which these persons obtain their pork and pork products. Tentatively, we divide these cases into four groups: (1) The highest (Boston and San Francisco), (2) the lowest (New Orleans), (3) the sample apparently representing the most groups of diverse sorts (Washington), and (4) the intermediate between the highest and lowest (all other localities). We suggest that these are correlated with the eating of pork from swine which are handled in the following ways: (1) The highest incidence with a mixed swine supply having a rather large proportion of garbage-fed hogs and swill-fed hogs in it; (2) the lowest with a swine supply in which hogs are run at large in woods and fields, often not under fence, and including everything from purebred hogs to razorbacks; (3) the Washington sample with a swine supply raised under all sorts of conditions everywhere in the United States; and (4) the intermediate with a swine supply which is raised under conditions ranging from the excellent McLean County swine sanitation system to the swill-fed hogs of the dirty hog lot.

We have resolved the old problem as to the source of trichinae in swine, whether from rats, or swine carcasses, or raw and undercooked pork scraps in garbage and swill, in favor of the idea that pork scraps

in garbage and swill are the important sources of trichinae in swine and, hence, of trichinae in man. This is a conclusion which was arrived at almost a half century ago by Mark (1889), in very competent reasoning based on sound observations around Boston, a work which has been quite generally overlooked in the subsequent literature on the subject. At almost the same time, Calvin (1890), in Iowa, published data supporting the same thesis, although he drew from them what seem to be somewhat unwarranted conclusions. Hall (1935) and Schwartz (1936), as noted in the next paragraph, have recently published confirmatory data.

Accepting this thesis as correct, we would explain the geographic distribution of trichinae in the United States as follows:

(1) There are on the Eastern seaboard large garbage-feeding establishments supplying pork to Eastern cities, including such important ports as New York, Philadelphia, and Boston, and we suspect that these establishments are largely responsible for the relatively high incidence of trichinae at Boston, as they are known to be responsible for some of the outbreaks of human trichinosis in New York City and nearby points. In addition, the practice of swill-feeding is common in New England. Similarly, there is on the West Coast a very large garbage-fed hog industry, including what is probably the largest plant of the sort in the world, supplying pork to such important ports as San Francisco and Los Angeles, and to this fact we attribute the high incidence of trichinae in San Francisco. Hall (1935) has reported the incidence of live trichinae in grain-fed hogs as 1.5 percent, and in garbage-fed hogs as 4.8 percent, or more than three times as high in garbage-fed hogs as in grain-fed hogs, and, in a later report, Schwartz (1936) has stated that the incidence in grain-fed hogs was about 1 percent, and that in garbage-fed hogs about 5 percent, or five times as high in garbage-fed hogs.

(2) Throughout the South, in spite of a gradual trend to other methods, swine are still allowed to run at large to a great extent, often feeding on acorns in oak forests after the manner of the mast-fed hogs of England, and frequently living out in the fields or woods with little attention and no feed aside from what they can find for themselves until they are brought up for fattening on peanut fields or on other crops previous to slaughter or shipment. Under such conditions they are not exposed to any great extent to infection with trichinae. Dr. L. A. Spindler, of the Bureau of Animal Industry, states that he found a very low incidence in swine in Georgia.

(3) As already noted, the Washington sample includes persons from widely distributed parts of the United States, representing exposure to infection with trichinae under all of the conditions prevailing throughout the United States and its possessions.

(4) Throughout the Middle West and in such States as New York and Minnesota, swine are raised under conditions ranging from those of the swine sanitation system, which Hall (1936) has pointed out as probably our best control measure for trichinosis, to those of the filthy hog lot with its swill-fed and slop-fed hogs, and these latter are probably the important determinants in the occurrence of trichinae in these areas of intermediate incidence. Obviously, studies of necropsy cases from the Rocky Mountain States, the Southwest, and the Alabama, Georgia, South Carolina, and Florida region, and of swine from various regions, are needed to complete our present picture.

IMPLICATIONS FROM INCIDENCE DATA

In general, previous writers have been content to report the incidence of trichinae as ascertained by them, and to state, in effect, that infestation with trichinae in the United States is not as rare a condition as it is commonly supposed to be. Unfortunately, percentages are not an impressive form of statement for the purpose of calling attention to an existing evil, and we now wish to put the question: What does the incidence of trichinae, as shown by their presence in 222 of 1,778 cadavers in the East, West, North, South, and intermediate regions, imply as to the actual number of cases of zoological and clinical trichinosis in the United States?

If we take our unweighted average of approximately 12.5 percent, a figure which for several reasons is obviously too low, as has already been pointed out, it implies that one out of every eight persons in our population of 130,000,000 persons is infested with trichinae, or approximately 16,000,000 persons above the age of infancy, provided the incidence in cadavers examined gives the incidence for the general population, an assumption that cannot be made at this time and on the available information. Many of the cases must represent severe clinical trichinosis, but at the most, only a few hundred such cases are ever diagnosed in any one year, and the implication is that relatively few of the actual cases are ever recognized. Not one of the 222 positives had a history of a disease diagnosed as trichinosis. Ransom (1915) states that in 1,550 cases in the United States from 1842 to 1915, there were 240 deaths, a case fatality of about 16 percent, but notes that these were severe cases, of a sort likely to be detected, and thinks the actual case fatality rate is much less. There are no sound mortality statistics, such as would take account of the more or less atypical cases not diagnosed at present; but if we assume, for the purpose of discussion, that severe clinical trichinosis, tentatively regarded here as produced by over 500 larvae per gram, has a case fatality rate of 1 percent, there would be many deaths from undiagnosed trichinosis annually. The facts are unknown, but we believe that a serious problem has been overlooked. Finally there are certainly serious

after-effects of clinical trichinosis in some cases, although the proportion of such cases to the total cases is unknown.

Are these implications substantially correct? The extent to which the trichinae infestations found by us in persons dying in hospitals would not have practically identical counterparts in persons dying at home or elsewhere, or, if we had suitable diagnostic methods, in the active and presumable well population of this country, is not known, although we are planning a study to give some information on this point. Notably, not one case of the 222 positives reported was a clinical case of trichinosis while hospitalized just previous to death, so the scales are not weighted in favor of a too high incidence by virtue of their origin as cases of trichinosis in hospitals. The answer to the question will have to come from further developments. However, let us suppose that our conclusions are exaggerated, and that the picture we present is 10 times as bad as the reality. Would a mere 1,600,000 infested persons, with the certainty that there were many overlooked cases of clinical trichinosis and of deaths from undiagnosed trichinosis, warrant respectful consideration? We shall assemble other facts on this subject in later papers, but at the moment we note only such selected items as seem most in order at this time.

The two parasitic worms which most certainly break through the barriers of modern sanitation are trichinae and pinworms, both of them worms which still have received wholly inadequate attention in research and in medical practice. The Federal meat inspection provides for such cooking, refrigeration, and processing as will destroy trichinae in meat products intended to be eaten without cooking. It does not provide for inspection of pork for trichinae, a procedure which would be very expensive and highly impracticable under high-speed American packing-house procedures, and it inspects only approximately 70 percent of the meat marketed in the United States. Outside of that inspection there is very little meat inspection by competent inspectors. A gap of approximately 30 percent in our meat inspection fence allows an ample supply of trichinae to drive through in pork products customarily eaten raw and permits these most deadly of the parasitic worms to reach their destination in human hosts.

For a variety of reasons, into which we cannot go at this time, the United States, so far as data are available, has the greatest problem in trichinosis of any country in the world, even though we suspect that the supposed incidence in some other countries is greater than it is thought to be. We emphasize here a point which does not seem to have been made in American literature, but we are not the first to make the point. About 50 years ago, R. Blanchard (1887) stated that the extreme abundance of trichinae in swine raised in the United States warranted the statement that trichinosis is very common there in man, perhaps more common even than in Germany, the other

outstanding area of infection, and raised the question as to whether trichinosis originated in the New World, a question which he answered, correctly as we believe, in the negative. Joyeux (1922) stated that, during the second half of the nineteenth century, there were two principal foci of infection with trichinosis, namely, the United States and northern Germany. According to Ostertag (1919), there is a constantly decreasing incidence of trichinae in swine in Germany, the incidence even in 1919 being a small fraction of 1 percent. The available figures given by Hall (1935) and Schwartz (1936) on trichinae in swine in the United States at this time indicate no decline in porcine trichinosis from the former incidence of 1.41 percent for live trichinae present in 1898–1906. A consideration of the figures in table 3 indicates that the findings for human infestations in 1931 and subsequently, as compared with the findings for 1901 and previously, give no grounds for believing that there is a declining incidence in human trichinosis in the United States. That there would be some correlation between porcine and human trichinosis in any country can hardly be doubted.

In discussing our findings with Dr. D. A. Shorb, of the Bureau of Animal Industry, he made the remark: "Your human cases are running higher than our garbage-fed hogs." This is a rather impressive statement that deserves the thoughtful attention of the medical profession. We believe that this idea and the findings that we have brought out in this paper indicate correctly two striking facts: That the United States has the greatest problem in trichinosis of any country in the world; and that the problem is one of major importance, apparently affecting to some degree, at a conservative estimate, at least several million persons, with clinical trichinosis in some form affecting possibly several hundred thousand persons, and with possibly several thousand deaths. If the situation is even half as serious as it appears to be, then something in the way of organized and adequate action should be taken to fill the gaps in our existing knowledge by research, and to apply the known control measures to a much greater extent than they are applied at present.

CONTROL OF TRICHINOSIS

It would be ill-considered to point out this problem without giving at least brief consideration to the known control measures for trichinosis. They have been discussed by Hall (1936) and may be summarized as follows: Meat inspection of a quality equivalent to that of the Federal meat inspection system should be extended to all meat produced in the United States, either by an extension of the Federal inspection or by the development of equally sound systems under States, counties, or cities to take care of the 30 percent of meat not inspected by the Federal forces. The swine sanitation system,

under which swine are protected against trichinae by being raised on clean forage crops away from garbage, swill, hog carcasses and offal, and rats, should be much more widely used by hog raisers. This system gives a large measure of protection from various swine diseases, and makes money for the farmer, not only by preventing disease, but by raising hogs to market weight months earlier than in the case of hogs raised under dirty hog-lot conditions, and hence at a great saving in time and feed. Where hogs are fed on garbage or swill, it should be required by law that the garbage or swill be cooked to destroy trichinae, a procedure which is of great value also in preventing hog cholera and foot-and-mouth disease. Rat destruction by trapping and poisoning, carried out by trained experts whenever possible, should be much more extensively utilized.

The campaign to educate the public against the use of any raw pork, or of any pork products customarily eaten uncooked that do not originate in establishments under Federal inspection or an equivalent inspection, should be better organized and more intensive, since it is evident that the former idea that Germans and Italians constitute the preferred groups for trichinosis because of their food habits is no longer useful. It is only too evident that a large section of the American people as a whole have developed the habit of eating raw or improperly cooked pork and uninspected or inadequately inspected pork products, and we point to the eating of raw hamburgers, some of which contain pork as well as beef, as evidence of this habit. Pork is a wholesome and desirable form of meat, and its use should not be handicapped by unsound methods of raising swine or improper methods of handling or cooking the meat.[1] Finally, it is vital that

[1] The fact that trichinosis is common in the United States is not a reason for not eating pork, but is a reason for cooking it well. Precautions in preparing foods for use are not confined to pork or to the United States but are common to many foods and to all civilized countries. Beef, unless from a house under competent inspection, should also be thoroughly cooked to avoid the possibility of infection with the beef tapeworm. Fruits and vegetables are peeled or thoroughly cleaned before being used. Water supplies are treated, if necessary, for purification. Canned products in general are prepared according to certain specified scientific procedure. Foods attractive to man are attractive to microorganisms also, and so it becomes necessary, in handling fresh fruits, fresh vegetables, and fresh meats, to safeguard their freshness and wholesomeness from their source to the table. Continued vigilance is the price of excellence and quality, and meats and meat food products are no exception to this rule.

Pork is rich in protein, fat, and vitamin B. Investigations on the digestibility of meats reported by the United States Department of Agriculture, show that, on the basis of time required to leave the stomach, pork is digested in the stomach slightly more rapidly than turkey, in the same time as chicken, and slightly more slowly than beef or lamb.

For reasons of taste, as well as for precaution, fresh pork, fresh pork sausage, smoked hams and shoulders, bacon, and such products as smoked sausage, boneless loins, and coppa should be cooked until they are well done throughout before using. Thirty minutes to the pound is an approximate guide to sufficient cooking for large thick cuts of pork. Pork products of the sort customarily eaten without cooking by the consumer, consisting largely of various kinds of dry or summer sausage, are entirely safe to eat without cooking if prepared in an establishment operating under Federal meat inspection or other competent inspection, but should never be eaten without cooking unless they bear evidence of competent inspection. The pork used in such pork products is specially processed, under the close scrutiny of Government inspectors, to destroy any trichinae that may be present, the processing including cooking, special freezing, or special curing. There is no danger of acquiring trichinosis when proper care is used in the cooking of pork and pork products and in the selection of pork products customarily eaten raw to see that they have been prepared under competent inspection.

sound research on trichinosis, from the basic biology of trichinae to the development of dependable diagnostic procedures, a sound and effective therapy, and a comprehensive epidemiology, be extended and expedited.

SUMMARY

A study of 300 diaphragms from cadavers, coming from 10 hospitals in Washington, D. C., and 1 hospital at Baltimore, Md., shows 41 diaphragms infested with trichinae, an incidence of 13.67 percent.

The samples include cases from 5 Federal hospitals to which patients are sent from all over the United States, and from 6 Washington hospitals with cases originating widely over the United States, and they run the range of childhood to old age, military and civil life, association with land and sea, sane individuals and mentally deranged hospitalized cases, black and white, male and female, and high and low economic-social status.

All diaphragms were examined both by the direct microscopic method and by the digestion-Baermann method, since both methods have special value for certain types of infestation and both have certain limitations, the two methods being supplementary in these respects.

Examinations were made on a quantitative basis of trichinae per gram of diaphragm muscle examined. On this basis the series is arbitrarily divided into seven groups of lighter to heavier infestations, as a basis for tentative assumption and for further consideration.

Live trichinae predominate in light infestations and dead trichinae predominate in heavy infestations, and the theory is tentatively suggested that the rapidity of calcification may be proportional to intensity of infestation.

On the basis of 1,778 cases reported up to the present time, the writers conclude that an indicated incidence of approximately 12.5 percent, an unweighted average, is a conservative figure, probably definitely too low. If this figure is indicative of incidence throughout this country, there are probably several million persons in the United States who are infested with trichinae, among whom are possibly several hundred thousands who have had clinical trichinosis never diagnosed as such, and there are possibly several thousand deaths annually from this cause.

The following point is emphasized: That the United States apparently has the greatest problem of trichinosis of any country in the world, a problem involving, in one way or another and in some degree, several million persons. The incidence in man is greater than the incidence in garbage-fed hogs.

The background of the problem is considered, and an outline of the measures necessary for the control of the parasite, *Trichinella spiralis*, is given.

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HOSTS OF THE IMMATURE STAGES OF THE PACIFIC COAST TICK *DERMACENTOR OCCIDENTALIS* NEUM. (IXODIDAE)[1]

By GLEN M. KOHLS, *Assistant Entomologist, United States Public Health Service*

Dermacentor occidentalis is the common wood tick of the Pacific Coast region. In Oregon it is found west of the Cascade Mountains, the most northerly point of collection being near Yachats, Lincoln County.[2] In California it is found in most of the wooded regions of the State west of the summit of the Sierra Nevada Mountains, but is apparently absent from the northeast portion comprising all or part of the counties of Siskiyou, Modoc, Shasta, Lassen, Tehama, Butte, Plumas, Sierra, and Nevada.

This tick may prove to be of considerable importance as a vector of diseases of man and animals. Parker, Brooks, and Marsh (*1*) demon-

[1] Contribution from the Rocky Mountain Laboratory, United States Public Health Service, Hamilton, Mont.

[2] Record by Dr. W. J. Chamberlin, Corvallis, Oreg.

strated the occurrence of *Bacterium tularense* in adult ticks taken from cattle in San Benito County, Calif., and since that time *tularense*-infected specimens have been repeatedly collected in California and Oregon by staff members of the Rocky Mountain Laboratory. Though ticks of this species naturally infected with Rocky Mountain spotted fever have not been found, Parker, Philip, and Jellison (*2*) proved it to be an efficient vector under experimental conditions, and epidemiological data suggest that it is a vector for human cases of this disease occurring within its range of distribution. Herms and Howell (*3*) reported experimental transmission of bovine anaplasmosis by larval and nymphal *occidentalis* and suggested that this tick is the important vector of bovine anaplasmosis in California.

Hooker, Bishopp, and Wood (*4*) list the following animals as hosts of the adult ticks: Cattle, horse, man, deer, mule, dog, ass, rabbit, and sheep. As to hosts of immature stages, little information has been available. Because of the recovery of *Bact. tularense* from adult ticks, Parker, Philip, and Jellison (*2*) have suggested that the larval and nymphal ticks would be found to infest small mammals. Wherry and Wellman (*5*) report the finding of ticks identified by Mr. Nathan Banks as *D. occidentalis* on California ground squirrels (*Citellus beecheyi*). Herms and Howell ((*3*) and by correspondence) report the finding of immature stages on cattle.

During the period of May 5 to October 13, 1935, and from April 17 to August 15, 1936, studies on the life history and host relationships of this tick were carried on in Oregon and California by members of the staff of the Rocky Mountain Laboratory. In 1935 the field work was conducted in the region of Grants Pass, Josephine County, Oregon, by two enrollees of the Civilian Conservation Corps, under supervision of Entomologist R. A. Cooley. Work in 1936 was conducted by the writer in the Grants Pass (Oregon) area and in the following areas in California: Los Gatos, Santa Clara County; Pine Knot and Seven Oaks in San Bernardino County; Vista, San Diego County; San Juan Hot Springs, Orange County; Fillmore, Ventura County; Kernville, Kern County; Fairview, Tulare County; Santa Margarita, San Luis Obispo County; Oakland, Alameda County; and Willits, Mendocino County.

The results reported in this paper are limited to the data obtained on the natural hosts of the immature stages of this tick. Immature ticks were obtained by shooting and trapping small mammals, and the examination of livestock and other animals as opportunity afforded. Since it is impractical to make specific identifications of the immature forms, the ticks were forwarded to the Hamilton Laboratory where as many as possible were reared to the adult stage. Because of the fact that many ticks died in transit or could not be induced to feed on

laboratory animals and later died, only part of the larvae and nymphs obtained were reared to the adult stage. Adult ticks were collected wherever possible by "dragging".[3]

OREGON DATA

A list of the Oregon animals examined in 1935, the number examined, number infested, percentage infested, number of larvae and nymphs per host species, average number of ticks per infested animal, and the number of adult ticks reared from the immature ticks collected from each host species are presented in table 1. An approximate total of 2,425 immature *Dermacentor* ticks were collected, from which 833 adults were reared. All proved to be *D. occidentalis*. These ticks were from the following hosts: Douglas ground squirrels, *Citellus douglasii;* wood rats, *Neotoma cinerea* and *fuscipes*; chipmunks, *Eutamias townsendii;* brush rabbits, *Sylvilagus bachmani;* gray squirrels, *Sciurus griseus;* deer mice, *Peromyscus* sp., and coyote, *Canis* sp. Immature *Dermacentors* none of which were reared to the adult stage were collected from jack rabbits, *Lepus californicus*, and chickarees, *Sciurus douglasii*. That these ticks were also *occidentalis* is indicated by the foregoing results and rearing records and by the fact that the collection of a total of 682 adult ticks in the area by dragging and from livestock in 1935 and about 1,000 adults by dragging in 1936 yielded no other species of this genus.

Excluding the single coyote and the 3 gray squirrels, the percentage of infested animals among those examined was greatest in the case of brush rabbits. Seven of the 8 examined (87.5 percent) carried ticks. The number of ticks per animal, 22+, was also the largest found. Second in importance were ground squirrels. Of 169 specimens examined, 140 (82.8 percent) were infested and averaged 14 ticks each. Of 27 wood rats examined 18 (66.6 percent) were infested and averaged 12.5 ticks each.

Animal species on which no immature ticks were found, and the number of each species examined were as follows: 1 spotted skunk, *Spilogale phenax*, 2 shrews, *Sorex* sp., 2 deer, *Odocoileus* sp., 1 dog, *Canis familiaris*, 3 horses, and 2 burros.

CALIFORNIA DATA

A summary of collection and rearing data for California in 1936 is given in table 2. As with the immature ticks collected in Oregon in 1935, many of the ticks, particularly larvae, died in transit to Hamilton. Others refused to reattach on laboratory animals and subsequently died. Of a total of 1,863 immature *Dermacentor* ticks collected, 147 were reared to the adult stage. All were *D. occidentalis*.

[3] Sweeping a yard-square piece of white canton flannel, to which ticks readily cling, over vegetation.

TABLE 1.—*Natural host data—Immature stages Dermacentor occidentalis, Grants Pass, Josephine County, Oreg., 1935*

Animal species: Common name	Animal species: Scientific name	Number examined	Number infested	Percent infested	Larvae	Nymphs	Average per infested animal	Adults reared from immature stages
Douglas ground squirrel	*Citellus douglasii*	169	140	82.8	343	1,617	14.0	690
Wood rat	*Neotoma cinerea* and *fuscipes*	27	18	66.6	32	193	12.5	88
Chipmunk	*Eutamias townsendii*	77	25	32.4	18	12	1.2	2
Brush rabbit	*Sylvilagus bachmani*	8	7	87.5	Few	160	22±	45
Jack rabbit	*Lepus californicus*	5	3	60.0	3	5	2.6	0
Chickaree	*Sciurus douglasii*	33	1	3.0	2	0	2.0	0
Gray squirrel	*Sciurus griseus*	3	3	100.0	0	11	3.6	5
Mouse	*Peromyscus* sp. (principally)	101	14	13.8	2	24	1.8	2
Coyote	*Canis* sp.	1	1	100.0	0	3	3.0	1
Spotted skunk	*Spilogale phenax*	1	0					
Shrew	*Sorex* sp.	2	0					
Deer	*Odocoileus* sp.	2	0					
Horse	*Equus caballus*	3	0					
Burro		2	0					
Dog	*Canis familiaris*	1	0					

TABLE 2.—*Natural host data—Immature stages Dermacentor occidentalis, California, 1936*

Animal species		Number examined	Number infested	Percent infested	Larvae	Nymphs	Average per infested animal	Adults reared from immature stages
Common name	Scientific name							
California ground squirrel	*Citellus beecheyi*	276	163	59.0	407	617	6.2	95
Douglas ground squirrel	*Citellus douglasii*	33	31	93.9	108	114	7.1	0
Wood rat	*Neotoma lepida* and *fuscipes*	122	57	46.7	161	93	4.4	10
Chipmunk	*Eutamias* sp.	10	4	40.0	3	3	1.5	1
Brush rabbit	*Sylvilagus bachmani*	5	2	40.0	40	10	25.0	3
Cottontail	*Sylvilagus audubonii*	17	12	70.5	8	74	6.8	13
Jack rabbit	*Lupus californicus*	10	6	60.0	6	11	2.8	1
Gray squirrel	*Sciurus griseus*	1	1	100.0	0	1	1.0	0
Deer mouse	*Peromyscus* sp.	110	35	31.8	78	28	3.0	12
Mouse	Not known	27	2	7.4	22	0	11.0	0
Pocket mouse	*Perognathus* sp.	24	13	54.1	7	29	2.7	10
House mouse	*Mus musculus*	6	1	16.6	0	1	1.0	1
Harvest mouse	*Reithrodontomys* sp.	2	0					
Field mouse	*Microtus californicus*	1	0					
Kangaroo rat	*Dipodomys* sp.	3	1	33.3	7	5	12.0	0
Golden mantled ground squirrel	*Callospermophilus chrysodeirus*	15	1	6.6	0	1	1.0	0
Antelope ground squirrel	*Ammospermophilus leucurus*	8	0					
Shrew	*Sorex* sp.	2	0					
Spotted skunk	*Spilogale gracilis*	6	3	50.0	2	25	9.0	0
Horse	*Equus caballus*	17	1	5.8	0	1	1.0	1
Dog	*Canis familiaris*	3	0					
Man	*Homo sapiens*					1		0

Adults were reared from immature ticks collected from the following hosts: California ground squirrels, *Citellus beecheyi;* wood rats, *Neotoma lepida* and *fuscipes;* chipmunk, *Eutamias* sp.; brush rabbits, *Sylvilagus bachmani;* cottontails, *Sylvilagus audubonii;* jack rabbit, *Lepus californicus;* deer mice, *Peromyscus* sp.; pocket mice, *Perognathus* sp.; house mouse, *Mus musculus;* and horse. Collections of immature *Dermacentors* were made from the following hosts but were not reared to the adult stage: Douglas ground squirrels, *Citellus douglasii;* gray squirrel, *Sciurus griseus;* mice, species unknown; kangaroo rats, *Dipodomys* sp.; golden mantled ground squirrel, *Callospermophilus chrysodeirus;* spotted skunk, *Spilogale gracilis;* and man. There can be little doubt that these ticks were also *occidentalis* since 3,218 adult ticks were collected by dragging and from horses, and no species of this genus other than a single specimen of *variabilis* was taken.

Excluding the one gray squirrel examined, which carried only 1 tick, the greatest percentage of infestation was found among Douglas ground squirrels, 31 of 33 examined (93.9 percent) being infested. All of these squirrels were taken in one restricted area near Willits, Mendocino County, and the high percentage of infested animals might well be due to local conditions. Next were cottontail rabbits, of which 12 of 17 (70.5 percent) carried ticks. Third in order were jack rabbits with 6 of 10 animals examined (60.0 percent) serving as tick hosts. One *D. occidentalis* adult was reared from 17 larvae and nymphs collected from this host species, but large numbers of the adults of the rabbit *Dermacentor, D. parumapertus,* were found on all of these animals, and it appears probable that immature stages of this species were also represented among the larvae and nymphs collected. An infestation of 59.0 percent was observed among 276 California ground squirrels, there being 163 infested animals found. The 6 spotted skunks, 3 of which were infested, were all collected in the Oakland (Alameda County) area, in the same vicinity. Of 122 wood rats examined, 57 (46.7 percent) were infested. Four of 10 chipmunks and 2 of 5 brush rabbits, or 40 percent of each species, were infested. A single engorged nymph was collected from 1 of 17 horses examined in the Oakland area. A single nymph was found attached to the writer's arm.

Animal species on which no immature ticks were found and the number of each species examined were as follows: Two harvest mice, *Reithrodontomys* sp.; one field mouse, *Microtus californicus;* eight antelope ground squirrels, *Ammospermophilus leucurus;* two shrews, *Sorex* sp.; and three dogs, *Canis familiaris.*

The highest average number of ticks per animal was 25, on 2 brush rabbits, next 12, representing a single infested kangaroo rat of a total of 3 examined. Among the host species of which 4 or more infested

animals were found, the largest average number of ticks per infested animal occurred among Douglas ground squirrels, 7.1, next cottontails, 6.8, and third California ground squirrels, 6.2. Wood rats ranked fourth with 4.4.

DISCUSSION

From the foregoing data it is apparent that a wide variety of animals serve as hosts of the immature stages of *D. occidentalis*. Adult ticks were reared from immature stages collected from the following animals: *Citellus douglasii*, *Citellus beecheyi*, *Neotoma cinerea*, *lepida* and *fuscipes*, *Eutamias* sp., *Sylvilagus bachmani*, *Sylvilagus audubonii*, *Lepus californicus*, *Sciurus griseus*, *Peromyscus* sp., *Perognathus* sp., *Mus musculus*, *Canis* sp. (coyote), and horse. *Dermacentor* sp. larvae and nymphs, probably all *occidentalis* but not reared through to the adult stage, were collected from the following animals: *Sciurus douglasii*, *Dipodomys* sp., *Callospermophilus chrysodeirus*, *Spilogale gracilis*, "mouse", and man. With the record by Herms and Howell (*3*) of the finding of larvae and nymphs on cattle, the above list includes the known hosts of these stages. Had it been possible to make specific determinations of all host animals, the list would undoubtedly have been extended.

The following native animals, because of their abundance and general distribution in tick-infested regions, are of major importance as larval and nymphal tick hosts: Ground squirrels, *Citellus douglasii* and *C. beecheyi* in their respective ranges, and deer mice, *Peromyscus* spp. The following listed animals not so generally distributed, but often locally abundant, are also of importance: Wood rats, *Neotoma* spp.; brush rabbits, *Sylvilagus bachmani;* cottontails, *Sylvilagus audubonii;* jack rabbits, *Lepus californicus;* pocket mice, *Perognathus* sp.; and chipmunks, *Eutamias* sp.

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DEATHS DURING WEEK ENDED MAR. 27, 1937

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Mar. 27, 1937	Corresponding week, 1936
Data from 86 large cities of the United States:		
Total deaths	9,302	10,192
Average for 3 prior years	9,282	
Total deaths, first 12 weeks of year	123,390	118,392
Deaths under 1 year of age	595	674
Average for 3 prior years	615	
Deaths under 1 year of age, first 12 weeks of year	7,583	7,052
Data from industrial insurance companies:		
Policies in force	69,556,759	68,251,415
Number of death claims	14,220	14,510
Death claims per 1,000 policies in force, annual rate	10.7	11.1
Death claims per 1,000 policies, first 12 weeks of year, annual rate	11.5	11.1

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Apr. 3, 1937, and Apr. 4, 1936

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Apr. 3, 1937	Week ended Apr. 4, 1936	Week ended Apr. 3, 1937	Week ended Apr. 4, 1936	Week ended Apr. 3, 1937	Week ended Apr. 4, 1936	Week ended Apr. 3, 1937	Week ended Apr. 4, 1936
New England States:								
Maine			1	13	15	195	0	1
New Hampshire	1				53	35	0	0
Vermont	1	1			2	799	0	0
Massachusetts	3	4			632	1,109	11	13
Rhode Island	1				293	48	1	0
Connecticut	2	1	13	24	707	50	1	2
Middle Atlantic States:								
New York	27	57	[1] 22	[1] 17	776	2,909	8	21
New Jersey	19	13	19	26	3,728	324	3	5
Pennsylvania	43	31			595	721	11	14
East North Central States:								
Ohio	25	28	20	20	584	424	8	7
Indiana	10	11	312	116	137	28	7	6
Illinois	45	43	59	61	106	24	4	10
Michigan	10	11	2	12	78	110	2	4
Wisconsin	1	2	74	69	19	111	0	1
West North Central States:								
Minnesota	8	7	1		47	361	1	2
Iowa	7	8	8	5	3	2	1	1
Missouri	11	24	110	967	41	23	0	6
North Dakota			3	12			0	0
South Dakota		2			4	1	0	0
Nebraska	2	5		4	9	108	2	1
Kansas	4	15	8	81	15	9	1	1
South Atlantic States:								
Delaware	9	6			81	21	1	1
Maryland [2]	15	6	28	30	934	292	10	9
District of Columbia	11	11		1	69	45	2	7
Virginia	9	7		909	217	151	15	10
West Virginia	5	6	67	229	8	30	8	9
North Carolina [2]	9	18	69	107	168	64	4	10
South Carolina	4	2	707	303	38	17	1	8
Georgia [2]	4	10	336	657			2	3
Florida	4	3	35	12	5	18	12	1
East South Central States:								
Kentucky	8	8	17	202	151	77	13	48
Tennessee	11	6	132	552	24	70	14	10
Alabama [2]	5	17	674	1,823	9	50	17	7
Mississippi [2]	2	4					1	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Apr. 3, 1937, and Apr. 4, 1936—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Apr. 3, 1937	Week ended Apr. 4, 1936	Week ended Apr. 3, 1937	Week ended Apr. 4, 1936	Week ended Apr. 3, 1937	Week ended Apr. 4, 1936	Week ended Apr. 3, 1937	Week ended Apr. 4, 1936
West South Central States:								
Arkansas	1	9	129	367	4	7	0	3
Louisiana	16	9	68	606	164	67	0	3
Oklahoma [4]	4	23	162	323	26	21	1	9
Texas [3]	42	42	1,157	902	624	423	12	8
Mountain States:								
Montana	1		26	39	8	15	0	2
Idaho	1			4	18	15	3	0
Wyoming [3]					3		1	0
Colorado	5	10			4	25	0	2
New Mexico	4	3	3	85	129	54	3	0
Arizona		1	55	90	290	135	1	1
Utah [3]				3	24	21	0	0
Pacific States:								
Washington	1	2		57	51	362	4	1
Oregon [3]	1	1	36	93	9	269	0	2
California	22	26	417	351	136	2,640	3	7
Total	414	493	4,770	9,172	11,041	12,280	189	256
First 13 weeks of year	6,774	7,775	255,661	106,460	81,722	113,928	2,208	3,120

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Apr. 3, 1937	Week ended Apr. 4, 1936	Week ended Apr. 3, 1937	Week ended Apr. 4, 1936	Week ended Apr. 3, 1937	Week ended Apr. 4, 1936	Week ended Apr. 3, 1937	Week ended Apr. 4, 1936
New England States:								
Maine	0	2	27	7	0	0	0	4
New Hampshire	0	0	10	9	0	0	0	2
Vermont	0	0	7	12	0	0	0	0
Massachusetts	0	0	287	368	0	0	0	2
Rhode Island	0	0	55	25	0	0	0	0
Connecticut	0	0	142	102	0	0	2	5
Middle Atlantic States:								
New York	1	1	941	1,159	0	0	3	9
New Jersey	1	0	272	522	0	0	3	2
Pennsylvania	0	0	1,134	639	0	0	5	7
East North Central States:								
Ohio	0	0	331	463	0	0	2	39
Indiana	0	0	241	264	3	5	1	0
Illinois	2	1	861	885	67	8	0	10
Michigan	1	0	791	347	13	0	2	3
Wisconsin	0	1	304	557	2	9	1	1
West North Central States:								
Minnesota	0	0	158	383	4	5	1	0
Iowa	0	0	292	221	49	30	1	2
Missouri	0	0	275	115	62	7	0	2
North Dakota	0	0	20	55	6	3	1	4
South Dakota	0	0	76	77	2	27	0	0
Nebraska	0	0	87	213	8	34	0	0
Kansas	0	0	346	362	36	35	0	0
South Atlantic States:								
Delaware	0	0	7	3	0	0	0	0
Maryland [3]	1	1	58	60	0	0	2	4
District of Columbia	0	0	8	16	0	0	0	1
Virginia	2	0	20	51	0	0	4	3
West Virginia	1	0	70	55	0	0	4	2
North Carolina [3]	0	1	30	32	0	4	8	4
South Carolina	0	0	5	2	0	0	2	0
Georgia [3]	1	0	9	15	0	0	3	0
Florida	2	0	8	7	0	0	1	6

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Apr. 3, 1937, and Apr. 4, 1936—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Apr. 3, 1937	Week ended Apr. 4, 1936	Week ended Apr. 3, 1937	Week ended Apr. 4, 1936	Week ended Apr. 3, 1937	Week ended Apr. 4, 1936	Week ended Apr. 3, 1937	Week ended Apr. 4, 1936
East South Central States:								
Kentucky	3	0	57	43	0	1	9	4
Tennessee	1	0	27	29	0	0	2	9
Alabama [3]	0	0	9	7	0	1	3	0
Mississippi [1]	1	1	10	6	0	0	0	0
West South Central States:								
Arkansas	0	0	11	18	0	0	0	2
Louisiana	0	0	13	10	1	0	10	2
Oklahoma [4]	0	0	22	36	1	0	2	6
Texas [3]	4	0	138	59	2	5	13	2
Mountain States:								
Montana	0	0	27	101	14	6	0	0
Idaho	1	0	18	53	3	4	1	0
Wyoming [5]	1	0	33	67	7	3	0	0
Colorado	0	0	41	193	16	10	1	0
New Mexico	1	0	34	90	1	0	0	0
Arizona	1	0	5	23	0	0	0	2
Utah [2]	0	0	19	71	0	1	0	0
Pacific States:								
Washington	0	0	34	106	10	5	5	1
Oregon [5]	2	1	36	43	12	4	1	8
California	3	1	203	338	9	2	5	0
Total	30	10	7,609	8,319	328	209	98	148
First 13 weeks of year	289	226	88,382	103,532	3,982	2,873	1,406	1,376

[1] New York City only.
[2] Week ended earlier than Saturday.
[3] Typhus fever, week ended Apr. 3, 1937, 27 cases, as follows: North Carolina, 1; Georgia, 8; Alabama, 10; Texas, 8.
[4] Exclusive of Oklahoma City and Tulsa.
[5] Rocky Mountain spotted fever, week ended Apr. 3, 1937, 3 cases, as follows: Wyoming, 1; Oregon, 2.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
December 1936										
Colorado		28	74		26		3	223	16	2
February 1937										
Alabama	18	74	4,233	100	38	11	3	60	6	9
Virginia	34	75	15,147	4	861	3	2	135	1	10
March 1937										
District of Columbia	9	52	20		389		1	56	0	1
Nebraska	3	10	27		25		1	324	39	0
North Carolina	20	64	956		593	22	2	167	1	11

Summary of monthly reports from States—Continued

December 1936

	Cases
Colorado:	
Chicken pox	302
Dysentery (bacillary)	2
Impetigo contagiosa	1
Jaundice	12
Mumps	32
Septic sore throat	7
Trachoma	8
Vincent's infection	1
Whooping cough	239

February 1937

	Cases
Chicken pox:	
Alabama	143
Virginia	263
Dysentery:	
Alabama (amoebic)	1
Virginia (diarrhea included)	36
Encephalitis, epidemic or lethargic:	
Alabama	4
Virginia	1
German measles:	
Alabama	2

February 1937—Continued

	Cases
Mumps:	
Alabama	186
Virginia	294
Ophthalmia neonatorum:	
Virginia	1
Paratyphoid fever:	
Virginia	1
Rabies in animals:	
Alabama	78
Rocky Mountain spotted fever:	
Virginia	1
Septic sore throat:	
Virginia	11
Tetanus:	
Alabama	2
Tularaemia:	
Alabama	2
Virginia	3
Typhus fever:	
Alabama	8
Undulant fever:	
Alabama	2
Virginia	1
Whooping cough:	
Alabama	121
Virginia	271

March 1937

	Cases
Chicken pox:	
District of Columbia	176
Nebraska	106
North Carolina	819
German measles:	
North Carolina	700
Mumps:	
Nebraska	169
Ophthalmia neonatorum:	
North Carolina	2
Paratyphoid fever:	
North Carolina	1
Septic sore throat:	
Nebraska	10
North Carolina	10
Tularaemia:	
North Carolina	1
Typhus fever:	
North Carolina	3
Undulant fever:	
Nebraska	1
North Carolina	3
Whooping cough:	
District of Columbia	37
Nebraska	41
North Carolina	542

WEEKLY REPORTS FROM CITIES

City reports for week ended Mar. 27, 1937

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table. Weekly reports are received from about 700 cities, from which the data are tabulated and filed for reference.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	233	534	129	7,370	948	2,728	23	421	23	1,503	------
Current week [1]	141	386	103	3,108	930	2,471	41	391	13	1,364	------
Maine:											
Portland	0	------	0	0	3	4	0	0	0	11	22
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	8
Manchester	0	------	0	3	0	12	0	0	0	0	19
Nashua	0	------	0	7	0	0	0	0	0	0	6
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	0	16
Rutland	0	------	0	0	1	3	0	0	0	0	7
Massachusetts:											
Boston	0	------	4	13	35	70	0	5	0	127	209
Fall River	0	------	1	23	3	5	0	1	0	7	36
Springfield	0	------	0	7	4	3	0	1	0	32	32
Worcester	1	------	0	165	5	9	0	3	0	41	52
Rhode Island:											
Pawtucket	0	------	0	1	0	1	0	0	0	0	18
Providence	0	1	0	265	7	34	0	5	1	39	68
Connecticut:											
Bridgeport	0	------	0	20	3	60	0	4	0	0	39
Hartford	0	------	0	3	5	3	0	0	0	0	48
New Haven	0	1	0	2	2	7	0	2	0	0	51
New York:											
Buffalo	0	------	1	85	14	30	0	1	0	40	157
New York	39	32	11	298	203	469	0	83	3	57	1,738
Rochester	1	1	0	1	7	8	0	1	0	15	63
Syracuse	0	------	0	4	6	49	0	0	0	30	50
New Jersey:											
Camden	1	1	1	0	6	2	0	0	0	1	18
Newark	0	6	1	748	20	25	0	3	0	16	114
Trenton	0	------	0	0	4	5	0	1	0	0	35

[1] Figures for Barre and Topeka estimated; current reports not received.

City reports for week ended Mar. 27, 1937—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Pennsylvania:											
Philadelphia	8	10	7	17	46	246	0	22	0	41	531
Pittsburgh	5	6	5	43	20	45	0	4	0	28	150
Reading	0	------	0	41	7	13	0	2	0	12	31
Scranton	0	------	------	1	------	22	0	------	0	0	------
Ohio:											
Cincinnati	2	5	0	103	17	17	0	12	0	5	157
Cleveland	0	30	3	50	24	49	0	8	0	47	231
Columbus	1	3	3	3	6	8	0	3	0	15	97
Toledo	1	3	3	65	2	5	0	3	0	36	67
Indiana:											
Anderson	0	------	1	3	3	10	0	0	0	1	11
Fort Wayne	1	------	0	1	5	0	1	0	0	7	26
Indianapolis	2	------	2	48	15	46	0	7	0	29	111
Muncie	0	4	0	0	6	2	0	0	0	1	17
South Bend	0	------	0	1	0	0	0	0	0	0	13
Terre Haute	2	------	0	0	0	0	0	0	0	1	17
Illinois:											
Alton	0	------	1	0	1	10	0	0	0	3	5
Chicago	10	16	6	39	57	255	0	40	0	55	692
Elgin	1	------	0	0	2	0	0	0	0	7	13
Moline	0	1	0	0	0	0	0	0	0	6	12
Springfield	0	------	0	0	3	4	0	0	0	11	27
Michigan:											
Detroit	3	1	1	13	31	445	0	16	0	65	275
Flint	0	------	0	0	5	26	0	1	1	3	39
Grand Rapids	0	------	0	13	2	11	0	1	0	13	38
Wisconsin:											
Kenosha	0	------	0	1	0	2	0	0	0	5	14
Madison	0	------	0	3	1	2	0	0	0	4	17
Milwaukee	1	2	2	5	10	60	0	7	1	22	115
Racine	0	------	0	1	1	7	0	1	0	0	12
Superior	0	------	1	0	0	2	0	0	0	8	11
Minnesota:											
Duluth	0	------	0	0	0	0	0	1	0	4	20
Minneapolis	1	------	2	0	3	14	0	3	1	11	100
St. Paul	0	------	0	0	2	16	4	0	0	83	47
Iowa:											
Cedar Rapids	0	------	------	0	------	2	0	------	0	0	------
Davenport	0	------	------	0	------	3	0	------	0	0	------
Des Moines	0	------	------	0	------	39	1	------	0	0	41
Sioux City	0	------	------	0	------	13	0	------	0	1	------
Waterloo	2	------	0	1	------	20	0	------	0	18	------
Missouri:											
Kansas City	1	2	2	0	14	102	0	0	0	4	100
St. Joseph	0	------	1	0	2	17	26	1	0	0	29
St. Louis	10	------	4	1	26	80	3	6	0	89	260
North Dakota:											
Fargo	0	------	0	0	0	6	2	2	0	0	8
Grand Forks	0	------	------	0	------	0	2	------	0	4	------
Minot	0	------	------	0	0	3	0	0	0	0	5
South Dakota:											
Aberdeen	0	------	------	0	------	5	0	------	0	0	------
Nebraska:											
Omaha	0	------	0	0	4	8	1	3	0	6	73
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	4	4
Topeka	------	------	------	------	------	------	------	------	------	------	------
Wichita	0	------	0	13	6	6	0	0	0	4	28
Delaware:											
Wilmington	0	------	0	10	4	2	0	0	0	0	31
Maryland:											
Baltimore	0	14	4	701	20	18	0	14	0	41	244
Cumberland	0	1	0	1	1	0	0	0	0	0	15
Frederick	0	------	0	11	0	0	0	0	0	0	6
Dist. of Columbia:											
Washington	10	1	0	114	11	14	0	10	0	9	170
Virginia:											
Lynchburg	8	------	0	1	3	1	0	1	0	10	13
Norfolk	1	------	1	7	6	4	0	1	0	1	39
Richmond	0	------	1	5	7	3	0	2	1	0	61
Roanoke	0	------	0	108	3	0	0	1	0	5	17
West Virginia:											
Charleston	0	------	0	1	4	0	0	0	0	7	27
Huntington	0	------	------	1	------	0	0	------	0	0	------
Wheeling	1	------	1	1	1	0	0	0	0	4	48

City reports for week ended Mar. 27, 1937—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
North Carolina:											
Gastonia	0	------	------	0	------	0	0	------	0	0	------
Raleigh	0	------	0	0	2	1	0	2	0	0	19
Wilmington	0	------	0	0	2	0	0	0	0	0	17
Winston-Salem	0	------	1	0	5	2	0	1	0	0	17
South Carolina:											
Charleston	2	49	1	1	7	2	0	0	0	0	26
Columbia	------	------	------	------	------	------	------	------	------	------	------
Florence	1	------	0	0	4	0	0	0	0	0	12
Greenville	0	------	0	0	1	0	0	1	0	4	6
Georgia:											
Atlanta	5	64	1	1	18	7	0	7	0	1	93
Brunswick	0	1	1	1	2	0	0	0	0	3	7
Savannah	0	34	2	0	3	1	0	4	0	4	34
Florida:											
Miami	0	6	2	2	3	0	0	3	1	0	49
Tampa	1	1	1	1	4	2	0	0	1	0	32
Kentucky:											
Ashland	0	6	1	1	0	0	0	0	0	0	2
Covington	0	------	1	4	3	4	0	2	0	1	25
Lexington	0	5	0	5	5	0	0	1	0	15	23
Louisville	3	------	0	3	17	11	0	7	16	0	109
Tennessee:											
Knoxville	0	2	2	0	3	0	0	1	1	0	21
Memphis	0	------	1	2	20	4	0	5	0	11	91
Nashville	0	------	1	0	5	2	0	1	0	3	55
Alabama:											
Birmingham	1	59	4	0	17	5	0	5	0	2	120
Mobile	5	2	2	0	7	2	0	2	0	0	34
Montgomery	1	4	------	0	------	1	0	------	0	0	------
Arkansas:											
Fort Smith	1	------	------	0	------	0	0	------	0	0	------
Little Rock	1	------	0	1	0	7	0	0	0	0	------
Louisiana:											
Lake Charles	0	------	0	0	0	0	0	0	0	0	1
New Orleans	8	16	6	3	22	1	0	10	0	2	170
Shreveport	1	------	0	1	13	0	0	1	0	1	54
Oklahoma:											
Muskogee	0	------	------	0	------	3	0	------	0	0	------
Oklahoma City	0	7	0	0	6	8	0	0	0	0	41
Tulsa	0	------	------	2	------	5	0	------	0	5	------
Texas:											
Dallas	3	3	3	41	7	14	0	5	0	11	68
Fort Worth	0	------	1	63	5	8	0	1	0	4	35
Galveston	0	------	0	0	4	1	0	2	0	4	22
Houston	5	------	3	1	12	6	0	7	1	21	96
San Antonio	0	------	1	15	6	2	0	10	0	2	66
Montana:											
Billings	0	------	0	0	1	2	0	0	0	0	5
Great Falls	0	------	0	0	1	2	0	0	0	3	8
Helena	0	------	0	7	2	4	0	0	0	0	4
Missoula	0	------	0	0	0	0	1	0	0	0	5
Idaho:											
Boise	0	------	0	0	2	1	0	0	0	0	2
Colorado:											
Colorado Springs	0	------	0	0	0	7	0	1	0	0	14
Denver	2	------	2	5	8	18	0	3	0	41	84
Pueblo	0	------	0	0	0	1	0	0	0	1	7
Utah:											
Salt Lake City	0	------	1	12	2	7	0	1	0	21	42
Nevada:											
Reno	------	------	------	------	------	------	------	------	------	------	------
Washington:											
Seattle	0	------	2	5	8	4	0	5	0	29	92
Spokane	0	------	0	3	3	3	0	0	1	2	38
Tacoma	0	------	0	0	0	3	0	1	0	1	28
Oregon:											
Portland	0	------	1	2	9	8	2	4	0	4	85
California:											
Los Angeles	4	20	3	20	30	29	3	21	1	97	402
Sacramento	0	------	0	4	9	12	0	1	0	2	37
San Francisco	0	4	2	4	8	14	0	17	0	34	183

City reports for week ended Mar. 27, 1937—Continued

State and city	Meningococcus meningitis		Poliomyelitis cases	State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				West Virginia:			
Boston	1	0	0	Wheeling	1	1	0
New York:				Georgia:			
New York	12	4	0	Savannah	1	0	0
New Jersey:				Florida:			
Newark	1	0	0	Miami	1	0	0
Pennsylvania:				Kentucky:			
Philadelphia	0	1	0	Ashland	1	0	0
Ohio:				Tennessee:			
Cincinnati	1	0	0	Knoxville	2	1	0
Illinois:				Memphis	2	0	0
Chicago	2	0	0	Nashville	1	1	0
Michigan:				Alabama:			
Detroit	1	0	0	Birmingham	8	4	0
Grand Rapids	1	1	0	Arkansas:			
Minnesota:				Little Rock	1	0	0
Minneapolis	1	0	0	Texas:			
St. Paul	1	0	0	Houston	1	0	0
Iowa:				Colorado:			
Des Moines	1	0	0	Denver	0	1	0
Missouri:				Washington:			
Kansas City	1	0	0	Spokane	1	0	0
St. Joseph	0	1	0	Tacoma	1	0	0
Maryland:				California:			
Baltimore	5	0	0	Los Angeles	1	2	0
District of Columbia:				San Francisco	0	0	1
Washington	2	1	0				
Virginia:							
Richmond	3	2	0				

Dengue.—Cases: Charleston, S. C., 2.
Encephalitis, epidemic or lethargic.—Cases: New York, 1; Muncie, 1; Dallas, 1.
Pellagra.—Cases: Chicago, 1; Raleigh, 1; Charleston, S. C., 1; Atlanta, 2; Savannah, 6; Dallas, 1.
Typhus fever.—Cases: Atlanta, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—2 weeks ended March 13, 1937.—During the 2 weeks ended March 13, 1937, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1	2		1	1		5
Chicken pox		8	2	195	591	56	54	17	41	964
Diphtheria		5	5	32	12	5	3			62
Dysentery				1						1
Erysipelas				6	10	4	7	6	11	44
Influenza	1	1,070	818	4,929	3,092	5	365		530	10,810
Lethargic encephalitis					2		1			3
Measles		19	74	598	945	98	849	164	782	3,529
Mumps		16	29		833	24	41	102	87	1,132
Pneumonia	1	9			102		13		4	129
Poliomyelitis							1			1
Scarlet fever		14	6	149	258	87	83	99	38	734
Trachoma							7		5	12
Tuberculosis	4	15	21	66	128	24	30	4	23	315
Typhoid fever				11	6				2	19
Undulant fever					4				1	5
Whooping cough		24	2	154	206	48	76	12	14	536

NOTE.—No report was received from Quebec for the week ended Mar. 6, 1937.

ITALY

Communicable diseases—4 weeks ended January 31, 1937.—During the 4 weeks ended January 31, 1937, cases of certain communicable diseases were reported in Italy as follows:

Disease	Jan. 4-10		Jan. 11-17		Jan. 18-24		Jan. 25-31	
	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected
Anthrax	13	11	8	8	15	15	9	9
Cerebrospinal meningitis	26	21	28	23	32	27	36	28
Chicken pox	482	168	462	167	406	183	398	162
Diphtheria and croup	549	299	546	305	564	312	538	293
Dysentery	12	8	6	6	5	5	5	5
Hookworm disease	2	2	3	3	3	3	12	5
Lethargic encephalitis			2	2			1	1
Measles	1,287	210	1,358	259	1,428	260	1,656	300
Mumps	343	101	386	118	348	100	434	117
Paratyphoid fever	30	26	24	18	32	25	31	25
Poliomyelitis	15	13	10	10	11	9	18	17
Puerperal fever	42	36	46	42	44	38	49	46
Rabies			1	1				
Scarlet fever	260	113	336	133	280	119	331	123
Typhoid fever	204	131	205	123	174	108	167	112
Undulant fever	48	36	46	37	45	36	54	45
Whooping cough	607	150	518	160	571	173	637	198

JAMAICA

Communicable diseases—4 weeks ended March 20, 1937.—During the 4 weeks ended March 20, 1937, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chicken pox	8	16	Puerperal septicæmia		1
Dysentery	10	5	Scarlet fever	1	2
Erysipelas		1	Tuberculosis	34	75
Leprosy	1	1	Typhoid fever	13	48

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for March 26, 1937, pages 372–385. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued April 30, 1937, and thereafter, at least for the time being, in the issue published on the last Friday of each month.

Plague

Bolivia—Chuquisaca Department.—During the month of February 1937, 5 cases of plague were reported in Chuquisaca Department, Bolivia.

Brazil.—During the month of January 1937, 1 case of plague was reported in Ceara State, and 4 cases of plague with 1 death were reported in Parahyba State, Brazil.

China—Hainan Island.—A report dated March 30, 1937, states that bubonic plague has appeared in the northeastern part of Hainan Island, China.

Hawaii Territory—Island of Hawaii—Hamakua District—Paauhau Sector.—A rat found on April 5, 1937, in Paauhau Sector, Hamakua District, Island of Hawaii, Hawaii Territory, has been found plague-infected.

Smallpox

Egypt—Qena Province.—During the week ended March 27, 1937, 1 case of smallpox was reported in Qena Province, Egypt.

Typhus Fever

Arabia—Aden.—During the week ended March 6, 1937, 1 imported case of typhus fever was reported in Aden, Arabia.

Bolivia.—During the month of February 1937, typhus fever was reported in the following Departments of Bolivia: La Paz, 18 cases; Oruro, 6 cases; Potosi, 1 case.

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